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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/607,191 | 06/27/2003 | Yoshinori Inoue | Q76324 | 5798 |

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SUGHRUE MION, PLLC
2100 PENNSYLVANIA AVENUE, N.W.
SUITE 800
WASHINGTON, DC 20037

| EXAMINER | |
|---|---|
| OLSEN, KAJ K | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 1753 | |

DATE MAILED: 10/04/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/607,191 | INOUE ET AL. | |
| | Examiner | Art Unit | |
| | Kaj K. Olsen | 1753 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-10* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 5-10* is/are rejected.

7)☒ Claim(s) *2-4* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *3-17-2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 112*

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 6 and 7 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

3. Claim 6 specifies that the NOx sensor element "includes an oxygen partial pressure detection cell". However, claim 1 already set forth an oxygen partial pressure detection cell. Applicant is presumably referring to the same cell so the claim should read --includes said oxygen partial pressure detection cell--.

4. Claim 6 is also confusing for its use twice of parenthetical text beginning "(hereinafter...". Applicant should delete this parenthetical text and refer to each of the currents preceding the parenthesis as the --first oxygen pump current-- and --second oxygen pump current-- respectively.

### *Claim Rejections - 35 USC § 103*

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are

such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 1 and 5-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over EP 0 937 979 A2 (hereafter "EP '979") in view of JP 2001-141696 (hereafter "JP '696") with or without Suzuki (USP 5,340,462).

8. EP '979 discloses a NOx measurement apparatus comprising a flow passage 11 to which gas is introduced (paragraph 0054), an oxygen partial pressure detection cell 3 for detecting oxygen concentration of the analyte gas introduced by the flow passage (paragraph 0068) and a first oxygen pump cell 3 for pumping oxygen both into or out of the interior of the flow passage on the basis of the oxygen concentration detected by the oxygen partial pressure detection cell (paragraph 0071). EP '979 further discloses a second oxygen pump cell 5 to which the analyte gas having an oxygen concentration controlled by the first oxygen pump cell flows and which decomposes nitrogen oxides within the gas and causes oxygen dissociated from the nitrogen oxides to migrate (paragraph 0074). EP '979 further discloses that a predetermined voltage Vp2 is applied across the second oxygen pump cell and the current Ip2 flowing through the second oxygen pump cell Ip2 and discloses a voltage generation means 75 for generating a voltage to be

applied across the second pump cell (paragraph 0074). EP '979 does not disclose a means for applying a voltage across the second oxygen pump cell to a predetermined voltage, which is higher than the predetermined measurement voltage to be applied during a measurement. However, JP '696 discloses that the second oxygen pump cell of a NOx sensor can be provided with a higher voltage during a warm-up period of the sensor operation such that the warm-up time for the sensor is shortened. See abstract and fig. 8. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of JP '696 for the apparatus of EP '979 so as to shorten the warm-up period for the sensor.

9. With respect to the presence of a clamp means to ensure the voltage doesn't exceed a predetermined level, EP '979 already disclosed for the first oxygen pump cell the use of diodes (59c, 59d) to ensure that an excessively large pump voltage is not applied to the first oxygen pump cell. See paragraph 0072. Although EP '979 did not apply this voltage to the second oxygen pump cell, the second oxygen pump cell as configured by EP '979 presumably was not at risk from excessively large voltages. However, the teaching of JP '696 renders obvious the application of a voltage in excess of normal operating voltages. One possessing ordinary skill in the art would have been motivated to utilize the diodes of EP '979 for the now modified second oxygen pump cell to prevent the application of voltage during the warm-up period that would be so excessive as to blacken the second oxygen pump cell.

10. This is further rendered obvious by Suzuki, which also teaches the use of a series of diodes 26 to limit the current applied to a pumping cell. See fig. 9 and col. 10, ll. 3-15. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of Suzuki for the apparatus of EP '979 and JP '696 in order to limit the

amount of current that can be applied to the second oxygen pump cell. This use of a diode to limit the voltage applied to a pump cell reads on the applicant's defined clamp means giving the claim language its broadest reasonable interpretation.

11. With respect to measuring NOx in exhaust gas from an internal combustion engine, that is only the intended use of the apparatus and the intended use need not be given further due consideration in determining patentability. However, see paragraph 0006 of EP '979. With respect to the use of the battery as a power source, see element 61 in fig. 6 of EP '979.

12. With respect to the detailed structure of claim 6, (except where discussed below) the cited passages from EP '979 already set forth the various specified operations of the claims. With respect to the specified activation means for applying a high voltage to the second oxygen pump cell, this is the purpose of voltage source V2 of JP '696 (see discussion above). With respect to the clamp means being located between the second oxygen pump cell and the control means, both EP '979 and Suzuki locate the clamping means between the control means for the pump cell and the pump cell itself. See fig. 6 of EP '979 and fig. 9 of Suzuki.

13. With respect to the use of a detection resistance, EP '979 discloses the use of resistor 107 for this purpose (see abstract). With respect to the clamp means including a diode connected between the detection resistance and the output terminal of the operational amplifier, neither EP '979 nor Suzuki disclose this. However, because the current Ip2 will be the same regardless of where the detection resistance is located and because the diode circuits of EP '979 and Suzuki will provide the same voltage clamping regardless of where the diodes are located along the line having current Ip2, one possessing ordinary skill in the art would recognize that the diodes could be placed either before or after the current detection resistance (i.e. either between or not

between the output terminal and detection resistance) without effective the performance of either element.

14. With respect to claim 8 (those limitations not already covered above), EP '979 discloses a oxygen ion solid electrolyte (see paragraph 0009) and the diodes of either EP '979 or Suzuki would always prevent an overvoltage from being applied to the nitrogen oxides detection cell.

15. With respect to the set forth predetermined voltages, EP '979 does not specify, but JP '696 teaches the use of 0.5 V for the NOx measurement. See fig. 8.

16. With respect to the presence of a diode and two resistors, EP '979 already discloses the presence of two resistors (any two of 107, 108a and 108b) and the addition of a diode to this circuit (see discussion above) would result in a circuit comprising a diode connected to the two resistors.

***Allowable Subject Matter***

17. Claims 2-4 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

18. The following is a statement of reasons for the indication of allowable subject matter: The prior art does not disclose nor render obvious all the limitations of claim 1 and further comprising the cumulative limitations of claim 2 with particular attention to a diode which is connected to a node between the inverted input terminal and the output terminal.

***Conclusion***

19. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Kurokawa et al (USP 5,980,710) teaches the use of a voltage clamp (col. 20, ll. 32-41), but not for reasons germane to the clamp means of the claimed invention.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kaj Olsen whose telephone number is (571) 272-1344. The examiner can normally be reached on Monday through Friday from 8:00 A.M. to 4:30 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen, can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

AU 1753
September 27, 2006

KAJ K. OLSEN
PRIMARY EXAMINER